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Rev. 06

NEW SITE IDENTIFICATION (NSI)

Part A – NEW SITE IDENTIFICATION INFORMATION
(To be completed by the Task Lead for New Site)

1.	**Site Title:** Fuel Reprocessing Complex Potential releases (Use known common names, location descriptors and or processes near or associated with the suspected inactive waste site.)	**Site Code:** CPP-117, CPP-118, CPP-119, CPP-120, CPP-121, CPP-122, and CPP-123 **NSI Evaluation Initiation Date:** November 22, 2004
2.	**Task Lead For New Site:** Mark R. Cole & Paul J. Smith	Phone: 526-0540, 526-0611
3.	**NSI Coordinator:** Wendell Jolley	Phone: 526-5990
4.	**Initiator or Initial Observer:** Wendy Savkranz	Phone: 526-4858

5. **Description of Suspected New Site and Location:** (A location map and/or diagram identifying the site against controlled survey points or global positioning system descriptors may be included. Document all existing information including historical, process, screening data, analytical data, radiological surveys etc. Attach supporting documentation)

The CERCLA new site identification form is for suspected releases to the environment of CERCLA constituents from activities associated with the Fuel Reprocessing Complex (FRC). The FRC is a complex of attached buildings (CPP-601, CPP-602, CPP-627 and CPP-640) that supported the reprocessing of spent nuclear fuel, which operated between 1952 and 1992. When operational, the FRC carried out spent nuclear fuel reprocessing activities with an overall focus on fuel dissolution, separations, and process analytical actions necessary to monitor the reprocessing. Support functions were provided in CPP-602, a laboratory/offices building. Considerable evidence exists demonstrating that highly radioactive mixed wastes reached the environment via structures and systems not designed for managing liquid wastes, or via structures or systems that malfunctioned, corroded, or failed due to faulty construction practices, or where construction materials were used that were incompatible with the waste solutions. At this time it is not known the degree in which these potential releases would have entered the environment though the building's walls, floor slabs and cold joints, though many of these potential avenues are in direct contact with underlying soils.

These potential releases would be in addition to existing release site CPP-80, a Group 2 site located under CPP-601. The following provides a description of the potential release sites and available information. The attached drawing identifies the approximate location for these potential releases.

CPP-117, CPP-602 sump and abandoned piping

General Description of Site and Release – Possible releases of liquid radioactive hazardous waste have occurred from CPP-602 from two sources. Source one includes releases from the LC-107 sump area due to the flooding of sump structures not constructed with water stops designed to contain liquids. Source two includes the abandoned, single-walled, cast iron piping used to transfer Process Equipment Waste Evaporator (PEWE) bound waste to the CPP-601 WG/WH "Deep Tanks."

Sump LC-107 received liquids from moisture and runoff infiltration into the building and any releases of liquid waste into the CPP-602 waste trench. Due to the acidic nature of one or more of the releases that historically accumulated in the sump, the concrete has deteriorated. During one flooding event in the LC-107 sump, liquid to a depth of greater than 20 feet had flooded and backed up into the CPP-602 waste trench, etching the concrete structure, resulting in a release of approximately 4000 gallons. There is no operational record, nor physical capability within the LC-107 sump area to suggest that this liquid was pumped out of the sump area, rather, it appears that the liquid may have migrated downward into the soil column via cold joints in the concrete (no water stops).

In terms of releases from CPP-602 piping, the original buried cast iron piping that discharged from the CPP-602 basement laboratories was abandoned in place because of loss of integrity and subsequent failure to transfer waste water to the Deep Tanks in CPP-601.

Nature and Time Frame of Releases

LC-107 Sump - There are several historical instances of leaking process equipment waste (PEW) waste pipes in the CPP-602 waste trench, which then routes to the LC-107 area. The waste was generated in the CPP-602 laboratory processes and routinely routed to the CPP-601 Deep Tanks. The waste was highly acidic (pH approximately 0), aqueous-metal-bearing with solvent components and typical fission products. The evidence of the release (etched concrete in the CPP-602 waste trench, deteriorated concrete at the bottom of the sump) was discovered in 1989, though the exact time frame and duration of the release is unknown.

Based upon a one time instantaneous filling of the sump and waste trench area, the possible release to the underlying soil was approximately 4,000 gallons. The actual release volume from this location may well have exceeded the one-time, instantaneous

volume, if waste remained within and continually replenished the sump as it leaked to the environment.

Abandoned Piping - Installed at the time of CPP-602 construction in the 1950s, the 4-inch, cast iron lines were not compatible with highly acidic, corrosive PEW waste. Though the exact time frame when their initial failure took place is not known, the lines were used until their design and operability flaws necessitated an upgrade to single-wall, direct-buried stainless steel lines in the 1985/86 time frame. These lines were eventually replaced with HWMA-compliant stainless steel secondarily contained lines in approximately 1991. The actual release volume from the abandoned cast iron lines is unknown, however because the origin of the waste was from laboratory activities in CPP-602, the waste would possess radiological and hazardous characteristics essentially identical to that released from the LC-107 sump area.

Mechanism of Release

Probable release from the LC-107 sump area occurred when acidic liquid waste encountered concrete structures that did not possess water tight water stops, and being concrete, were incompatible with highly acidic waste. Probable release from the abandoned cast iron piping was from direct contact soil, internal and external corrosion of the piping, piping failed and subsequent release of liquid to the soil column.

CPP-118, WG/WH Vaults ventilation outlet ducts –

General Description of Site and Release - In the 1983-84 time frame, personnel identified that liquid had collected in the WG/WH tank vaults to a depth of 3 to 4 feet, within the vault and unlined duct. The unlined duct penetrates the vault wall at approximately 6 inches from the vault floor, which was under water. The tanks vaults were lined with stainless steel. The ducts were not lined and were constructed without water stops, allowing any liquid coming in contact with the cold joint to eventually leak through the joint.

Nature and Time Frame of Release

The exact source of the waste is not known, but was likely from overflow of the WG/WH tanks through the man-way gasket seal. Based on this assumption, it was acidic (pH<0), aqueous "PEW" waste with metals, organics, and average-to-low activities of fission products. A second source was solutions from first cycle decontamination activities that leaked to the floor of the waste trench through failed welds in the G-cell floor drain. This liquid ran down the waste trench and into the WG/WH vaults. It was not detected in the waste trench sump because the alarm was set too high. The release was detected in the 1983 to 1984 time frame and it was apparent that the waste had been in contact with the vent ducting for at least 3 to 4 months. Failure to detect the presence of this depth of liquid in the tank vault was due to misinterpretations of sump level instrumentation, and the inability to detect the relatively small contribution the WG/WH sump jets made to the WG/WH tank levels when operated. After the problem was discovered, the bulk of the liquid was returned to the tanks using the sump jets. Surveys of the vaults revealed that the sump area had radiation fields of ~50R/h. The WG/WH tank vaults were upgraded in the late 1980s time frame and prior to 1991 by capping the original duct penetration with stainless steel and routing cell off gas at the vault ceiling level. The quantity of waste that escaped through the cold joints is unknown.

Mechanism of Release

Water released to the vent duct would encounter cold joints, not designed to contain liquid waste. The vent duct is direct buried in soil.

CPP-119, P-Cell wall drain –

General Description of Site and Release - It has been identified by examination with a boroscope camera that this drain line, 2" P-1138C, is not intact due to either a weld that was never completed or corroded away. This line managed condensate from the second cycle product evaporator that was ultimately discharged to the PEW system.

Nature and Time Frame of Release

The release in question originated from a stainless steel second cycle product evaporator condensate line which contained a weld that was not completed around the circumference of the pipe, leaving roughly a 1/8 inch gap around much of its circumference. Considering factors such as intermittent flow/use, the vertical orientation of the line in question, and lack of pressurization, the assumed loss from the system is 3% by volume over a 47 year operating cycle since 1953, an estimated 9,000 gallons of material was released. The liquid was second cycle product evaporator condensate, and under normal conditions, transferred to the PEW system. The liquid was moderately acidic, (pH<2), and contained mercury and other heavy metals, hexone solvent at 8 g/L, and relatively low activities of mixed fission products. At this estimated release fraction, the total releases would be approximately 100 grams for ionic mercury, 5 mCi for plutonium isotopes, 1mCi for Cs-137, and 274 kg for hexone.

Mechanism of Release

Defective weld on a 2 inch wall drain line, allowing liquid to escape the vertically oriented pipe when solution passed through the line.

CPP-120, CPP-601 west vent corridor (tunnel) and drains –

General Description of Site and Release - The original buried cast iron pipe/drains in the CPP-601 vent tunnel were abandoned in place and replaced with stainless steel. They were replaced in the late 1970s, early 1980s time frame due failure of this system, and loss of ability to carryout waste transfers to the CPP-601 WG/WH Deep Tanks. During the operation of this piping, this system received several spills of high activity solutions onto the vent tunnel floor from valve or pipe leaks and from condensate.

Nature and Time Frame of Release

Dissolution product streams, decontamination solutions with pH <0, heavy metals, and high activities of mixed fission products as evidenced by a 40 to 50 R/hr field at the release site upon discovery. Releases occurred at non-specific times during the late 1970s and early 1980s, with evidence that more than one event may have occurred. The quantity of released material cannot be accurately estimated, however, given that highly radioactive, corrosive liquid encountered a non-water stop, cold joint which itself led to the soil column, this constitutes reasonable evidence that a release to the environment had occurred.

Mechanism of Release

Leaks encounter a cold joint between CPP-601 west vent tunnel and the CPP-640 vent tunnel. The other mechanism was corrosion of a buried cast iron drain pipe, 4" WJ-1074T, allowing release to the soil, rather than the intended routing to the WG/WH tanks in CPP-601.

CPP-121, M-cell floor liner –

General Description of Site and Release - A small leak in the M-cell floor liner, approximately 3 inches above the floor, was identified when the floor was flooded with water during performance of criticality safety tests during the first use of M-cell (1983 timeframe). While there are no events identified that would have subsequently flooded this cell to this level, it is possible that during cell decontamination activities, small amounts of materials would be forced into this leak.

Nature and Time Frame of Release

The known releases to the M-cell floor were of aqueous third-cycle waste containing low acidity, high activities of transuranics, and low activities of fission products. Operations conducted subsequent to the 1983 time frame may have exposed the floor liner penetration to waste products. Cleanup of a 1984 operational leak from a failed pump could have led to the release of very small quantities of 400 g/L U-235 solution to the concrete beneath the cell liner. The cell floor is constructed in essentially a slab-on-grade manner, therefore cold joints would provide liquid direct access to the underlying soil. Estimated quantity of the release to the environment is less than five gallons.

Mechanism of Release

The concrete beneath the cell liner does not contain water stops at the junction of the cell floor and walls.

CPP-122, E-cell floor liner pinholes –

General Description of Site and Release - In the 1980-81 time frame, a release of highly contaminated hydrofluoric acid and dissolver product created pinhole leaks in the floor liner. Attempts were made in the 1985-86 time frame to decontaminate the liner using heated nitric acid on the cell (depth of 6 inches for a period of 2 weeks). This effort would have also released these materials to the concrete under the liner. The concrete is not resistant to the corrosive liquid, and was constructed without water stops between the junction of the cell floor and walls.

Nature and Time Frame of Release

The release was highly acidic (pH substantially < 0), high fluoride (corrosive to 304 L stainless steel), very highly radioactive first-cycle dissolver product, with high activities of fission products. The initial release likely occurred in the 1980/81 time frame during a dissolver campaign, then potentially again in the 1985/86 time frame during decontamination activities. While the exact quantity of the release cannot be accurately determined, the highly corrosive hydrofluoric and nitric acid solutions could have been in contact with the concrete structure, constructed without water stops for at least 2 weeks. This cell floor lies directly on soil.

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Mechanism of Release

The waste penetrated the cell secondary containment liner and encountered the concrete sub-floor, which was not constructed with water stops between the cell floor and wall or at the base of the dissolver footings where they penetrated the cell floor and formed the foundation for the dissolver.

CPP-123, F-cell sump

General Description of Site and Release - In the 1980-81 time frame, the F Cell floor was flooded with water to reduce radioactive contamination levels following a large leak from the E-Dissolver Off Gas (DOG) scrubber circulation pumps. Some of the solution leaked under the floor liner around an unsealed bolt that attached a ladder to the floor. The solution appeared to collect in a low point near the sump, maintaining a 5R/h field around the cell sump for years. In the 1990/91 time frame, a core drill was made in the F-cell near the sump and decontamination performed by flushing with water. This decontamination used dye flushed through an intentional penetration of the liner to both identify the leak source and to clean out the space under the liner. Initial water flushes were 10 to 14 R/hr. After flushing, the radiation readings in the area around the sump dropped to approximately 100 mR/hr. The liner penetrations were sealed after the flushing was complete.

Nature and Duration of Release

The release was first-cycle, acidic (pH < 2), high fluoride (complexed with aluminum nitrate) waste water, with high levels of mixed fission products, including ruthenium, a strong beta emitter. During the zirconium dissolver campaign of 1980/81, releases occurred during the campaign and potentially again during the 1990/91 cell decontamination effort. Considering the small breach of the cell liner and a relatively brief and one-time exposure of this breach to liquid waste, the estimated release is estimated to be small, probably less than 20 gallons.

Mechanism of Release

The waste penetrated the cell secondary containment liner at an unsealed bolt penetration, and encountered the concrete sub-floor, which was not constructed with water stops between the cell floor and wall or at the base.

6. **Is the site SWMU as defined in OSWER DIRECTIVE 9502.00-6?** ☐ **Yes** ☒ **No**

7. **Recommendation**

☐ Recommend not including as a new FFA/CO site. This site DOES NOT warrant further investigation, does not meet the criteria for acceptance, and should not be included under FFA/CO Action Plan.

☒ Recommend including as new FFA/CO site. This site DOES meet the criteria for acceptance, may warrant further investigation, and should be included under FFA/CO Action Plan.

Recommended WAG and Operable Unit to which site should be assigned:

WAG: 3 Operable Unit: 3-13 Group 2

Recommended action for this site:

☐ No Action ☐ No Further Action ☐ Remedial Action under Existing ROD ☒ Track 2 ☐ RI/FS

8. Responsible Manager Signature:

Name: Martin Doornbos Signature: Martin Doornbos Date: 4/19/05

NEW SITE IDENTIFICATION (NSI)

PART B – INEEL FFA/CO RESPONSIBLE PROGRAM MANAGERS (RPM'S) CONCURRENCE

Site Title:	Site Code:
Fuel Reprocessing Complex Potential releases	CPP-117, CPP-118, CPP-119, CPP-120, CPP-121, CPP-122, and CPP-123

DOE-ID FFA/CO RPM Concurrence: ☑ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: Mary C Verwolf Date: 4/19/05

Explanation:

The potential releases addressed in this document have resulted from spills and leaks from FRC operations. Due to the uncertainties associated with these releases in terms of actual quantities of waste released, the extent of contamination, and the constituents associated with the release, a Track 2 investigation will be pursued to provide a better assessment of the releases.

Kathleen E Hain 5/24/05

EPA FFA/CO RPM Concurrence: ☑ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: [signature] Date: 6-20-05

Explanation:

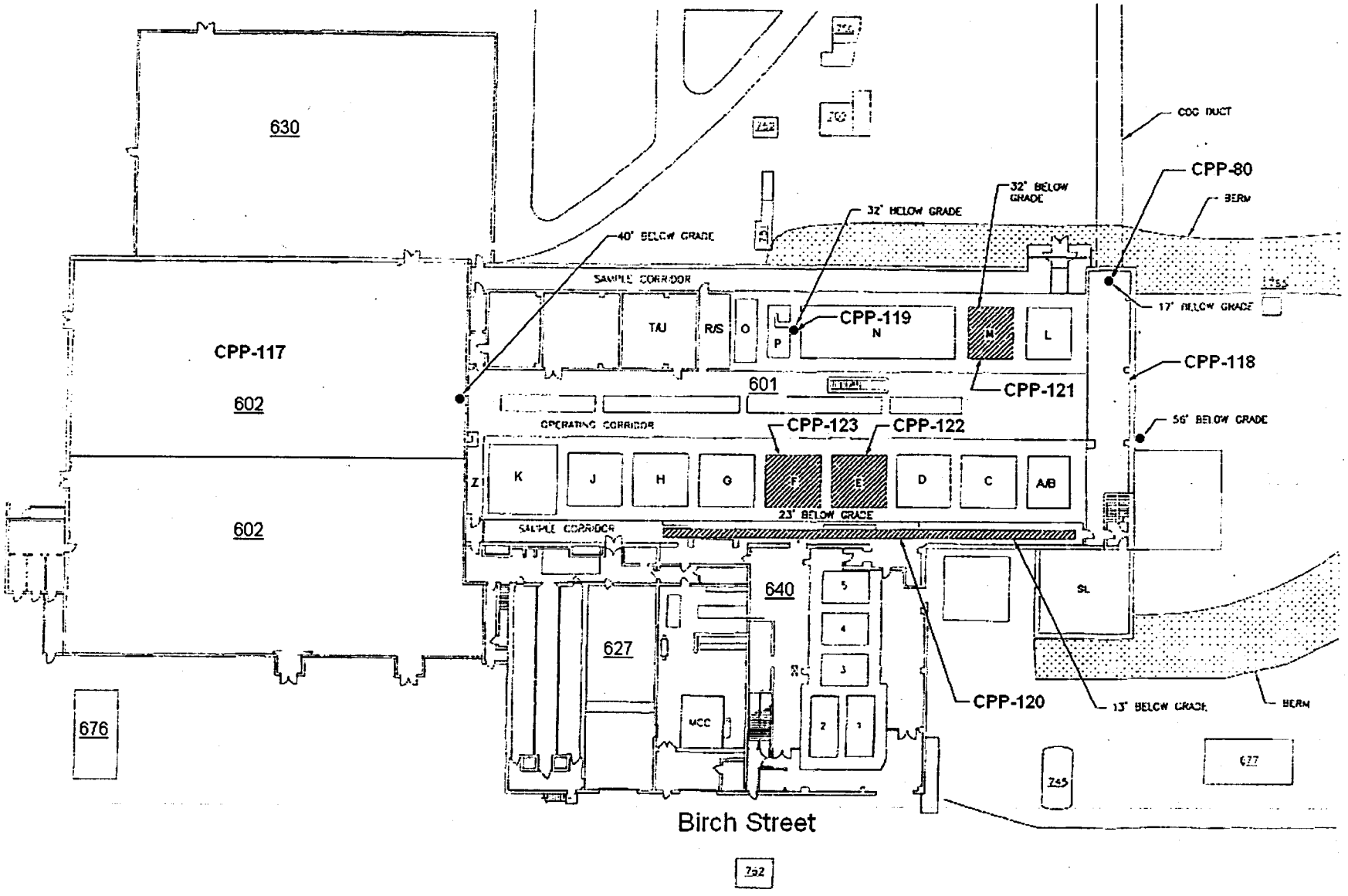
Agree a track 2 investigation is Warranted.

State of Idaho FFA/CO RPM Concurrence: ☑ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: Paul J. Hoh Date: 5-24-05

Explanation:

I concur that potential releases from the fuel reprocessing complex should be further investigated in a Track 2 investigation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